DISPLAY THIS CARD ON PRINCIPAL FRONTAGE OF WORK

CITY OF PORTLAND

BUILDING PERMIT

This is to certify that UNIVERSITY OF MAINE

Located At 246 DEERING AVE

Job ID: 2012-04-3828-CH OF USE

CBL: 051- E-001-001

has permission to Modify & upgrade existing rooftop wireless communication system & equipment, addition of 3 new antenna **provided that the person or persons, firm or corporation accepting this permit shall comply with all of the provisions of the Statues of Maine and of the Ordinances of the City of Portland regulating the construction, maintenance and use of the buildings and structures, and of the application on file in the department.**

Notification of inspection and written permission procured before this building or part thereof is lathed or otherwise closed-in. 48 HOUR NOTICE IS REQUIRED.	A final inspection must be completed by owner before this building or part thereof is occupied. If a certificate of occupancy is required, it must be

5/16/12

Fire Prevention Officer **Code Enforcement Officer / Plan Reviewer**

THIS CARD MUST BE POSTED ON THE STREET SIDE OF THE PROPERTY

PENALTY FOR REMOVING THIS CARD

City of Portland, Maine - Building or Use Permit Application

389 Congress Street, 04101 Tel: (207) 874-8703, FAX: (207) 8716

Job No:	Date Applied:	CBL:	
2012-04-3828-CH OF USE	**4/23/2012**	**051- E-001-001**	
Location of Construction: **246 DEERING AVE**	Owner Name: **UNIVERSITY OF MAINE**	Owner Address: **107 MAINE AVE BANGOR, ME 04401**	Phone:
Business Name: **Law School Building**	Contractor Name: **Nexlink Global Services**	Contractor Address: **800 Marshall Phelps Rd, Windsor Ct 06095**	Phone: **860-640-4834 978-399-8600**
Lessee/Buyer's Name:	Phone:	Permit Type: **BLDG ALT**	Zone: **USM Overlay/R-5**
Past Use: **University Law School**	Proposed Use: **Same: University Law School –To modify and upgrade the existing wireless communication sit with 3 addition antenna & associated equipment**	Cost of Work: **$20,000.00**	CEO District:
		Fire Dept: 5/15/12 ✓ Approved ___ Denied ___ N/A Signature: (58)	Inspection: Use Group: B/U Type: N/A IBC-2009 Signature: JMB 5/16/12
Proposed Project Description: **modification & upgrade of existing wireless commun**		Pedestrian Activities District (P.A.D.)	
Permit Taken By: Gayle			

1. This permit application does not preclude the Applicant(s) from meeting applicable State and Federal Rules.
2. Building Permits do not include plumbing, septic or electrial work.
3. Building permits are void if work is not started within six (6) months of the date of issuance. False informatin may invalidate a building permit and stop all work.

Zoning Approval

Special Zone or Reviews	Zoning Appeal	Historic Preservation
___ Shoreland	___ Variance	✓ Not in Dist or Landmark
___ Wetlands	___ Miscellaneous	___ Does not Require Review
___ Flood Zone	___ Conditional Use	___ Requires Review
___ Subdivision	___ Interpretation	___ Approved
___ Site Plan	___ Approved	___ Approved w/Conditions
___ Maj ___ Min ___ MM	___ Denied	___ Denied
Date: OK 4/24/12	Date:	Date:

CERTIFICATION

I hereby certify that I am the owner of record of the named property, or that the proposed work is authorized by the owner of record and that I have been authorized by the owner to make this application as his authorized agent and I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in the appication is issued, I certify that the code official's authorized representative shall have the authority to enter all areas covered by such permit at any reasonable hour to enforce the provision of the code(s) applicable to such permit.

SIGNATURE OF APPLICANT ADDRESS DATE PHONE

RESPONSIBLE PERSON IN CHARGE OF WORK, TITLE DATE PHONE

BUILDING PERMIT INSPECTION PROCEDURES

Please call 874-8703 or 874-8693 (ONLY)

or email: buildinginspections@portlandmaine.gov

With the issuance of this permit, the owner, builder or their designee is required to provide adequate notice to the city of Portland Inspections Services for the following inspections. Appointments must be requested 48 to 72 hours in advance of the required inspection. The inspection date will need to be confirmed by this office.

- **Please read the conditions of approval that is attached to this permit!! Contact this office if you have any questions.**
- **Permits expire in 6 months. If the project is not started or ceases for 6 months.**
- **If the inspection requirements are not followed as stated below additional fees may be incurred due to the issuance of a "Stop Work Order" and subsequent release to continue.**

Electrical Inspection prior to covering

Final Inspection

The project cannot move to the next phase prior to the required inspection and approval to continue, REGARDLESS OF THE NOTICE OF CIRCUMSTANCES.

IF THE PERMIT REQUIRES A CERTIFICATE OF OCCUPANCY, IT MUST BE PAID FOR AND ISSUED TO THE OWNER OR DESIGNEE BEFORE THE SPACE MAY BE OCCUPIED.

Acting Director of Planning and Urban Development
Gregory Mitchell

Job ID: 2012-04-3828-CH OF USE **Located At:** 246 DEERING AVE **CBL:** 051- E-001-001

Conditions of Approval:

Building

1. Application approval based upon information provided by applicant. Any deviation from approved plans requires separate review and approval prior to work.
2. Separate permits are required for any electrical, plumbing, sprinkler, fire alarm, HVAC systems, heating appliances, including pellet/wood stoves, commercial hood exhaust systems and fuel tanks. Separate plans may need to be submitted for approval as a part of this process.

2012 04 3826

66

General Building Permit Application

If you or the property owner owes real estate or personal property taxes or user charges on any property within the City, payment arrangements must be made before permits of any kind are accepted.

USM overlay R-5

Location/Address of Construction: 246 DEERING AVENUE (232)		
Total Square Footage of Proposed Structure/Area N/A	Square Footage of Lot	Number of Stories
Tax Assessor's Chart, Block & Lot Chart# 51 Block# E Lot# 1	Applicant *must be owner, Lessee or Buyer* Name AT&T MOBILITY Address c/o NEXLINK GLOBAL SERVICES 800 MARSHALL PHELPS RD City, State & Zip WINDSOR CT 06095	Telephone: PETER COOKE 978-399-8600
Lessee/DBA (If Applicable) AT&T MOBILITY RECEIVED APR 23 2012 Dept of Building Inspections City of Portland Maine	Owner (if different from Applicant) Name UNIVERSITY OF MAINE Address 107 MAINE AVE City, State & Zip BANGOR ME	Cost Of Work: $ 20000 C of O Fee: $ Total Fee: $ 220 24491 THIS IS NOT A change of use

Current legal use (i.e. single family) WIRELESS COMMUNICATIONS Number of Residential Units

If vacant, what was the previous use? N/A Cathy put it in Wrong

Proposed Specific use: WIRELESS COMMUNICATIONS

Is property part of a subdivision? NO If yes, please name

Project description: MODIFICATION AND UPGRADE OF EXISTING WIRELESS COMMUNICATIONS SITE TO INCLUDE 3 ADDITIONAL ANTENNAS AND ASSOCIATED EQUIPMENT

Contractor's name: NEXLINK GLOBAL SERVICES		
Address: 800 MARSHALL PHELPS RD	BRIAN PAUL	
City, State & Zip WINDSOR CT 06095	Telephone: 860-640-4834	
Who should we contact when the permit is ready: PETER COOKE	Telephone: 978-399-8600	
Mailing address: POB 894 WOLFEBORO NH 03894		

Please submit all of the information outlined on the applicable Checklist. Failure to do so will result in the automatic denial of your permit.

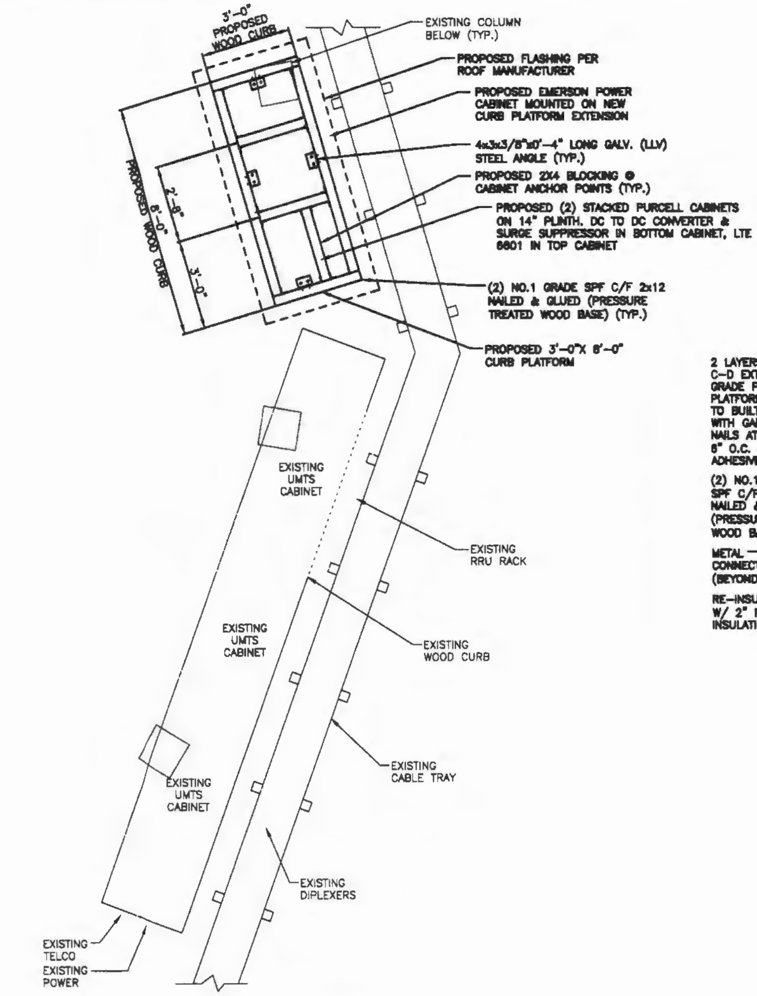
In order to be sure the City-fully understands the full scope of the project, the Planning and Development Department may request additional information prior to the issuance of a permit. For further information or to download copies of this form and other applications visit the Inspections Division on-line at www.portlandmaine.gov, or stop by the Inspections Division office, room 315 City Hall or call 874-8703.

I hereby certify that I am the Owner of record of the named property, or that the owner of record authorizes the proposed work and that I have been authorized by the owner to make this application as his/her authorized agent. I agree to conform to all applicable laws of this jurisdiction. In addition, if a permit for work described in this application is issued, I certify that the Code Official's authorized representative shall have the authority to enter all areas covered by this permit at any reasonable hour to enforce the provisions of the codes applicable to this permit.

Signature: AGENT FOR APPLICANT Date: 4/24/12

This is not a permit; you may not commence ANY work until the permit is issued

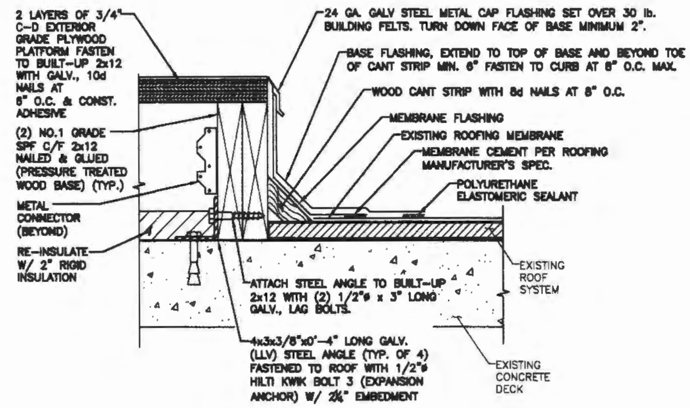
Revised 01-20-10


3'-0" PROPOSED WOOD CURB
PROPOSED WOOD CURB
2'-6"
8'-0"
3'-0"
EXISTING COLUMN BELOW (TYP.)
PROPOSED FLASHING PER ROOF MANUFACTURER
PROPOSED EMERSON POWER CABINET MOUNTED ON NEW CURB PLATFORM EXTENSION
4x3x3/8"x0'-4" LONG GALV. (LLV) STEEL ANGLE (TYP.)
PROPOSED 2X4 BLOCKING @ CABINET ANCHOR POINTS (TYP.)
PROPOSED (2) STACKED PURCELL CABINETS ON 14" PLINTH. DC TO DC CONVERTER & SURGE SUPPRESSOR IN BOTTOM CABINET, LTE 6601 IN TOP CABINET
(2) NO.1 GRADE SPF C/F 2x12 NAILED & GLUED (PRESSURE TREATED WOOD BASE) (TYP.)
PROPOSED 3'-0"X 8'-0" CURB PLATFORM
EXISTING UMTS CABINET
EXISTING RRU RACK
EXISTING UMTS CABINET
EXISTING WOOD CURB
EXISTING CABLE TRAY
EXISTING UMTS CABINET
EXISTING DIPLEXERS
EXISTING TELCO
EXISTING POWER

EQUIPMENT PLAN

SCALE: 1/2"=1'-0"

0 1'-0" 2'-0" 4'-0" 8'-0"


2 LAYERS OF 3/4" C-D EXTERIOR GRADE PLYWOOD PLATFORM FASTEN TO BUILT-UP 2x12 WITH GALV., 10d NAILS AT 6" O.C. & CONST. ADHESIVE
(2) NO.1 GRADE SPF C/F 2x12 NAILED & GLUED (PRESSURE TREATED WOOD BASE) (TYP.)
METAL CONNECTOR (BEYOND)
RE-INSULATE W/ 2" RIGID INSULATION
24 GA. GALV STEEL METAL CAP FLASHING SET OVER 30 lb. BUILDING FELTS. TURN DOWN FACE OF BASE MINIMUM 2".
BASE FLASHING, EXTEND TO TOP OF BASE AND BEYOND TOE OF CANT STRIP MIN. 6" FASTEN TO CURB AT 8" O.C. MAX.
WOOD CANT STRIP WITH 8d NAILS AT 8" O.C.
MEMBRANE FLASHING
EXISTING ROOFING MEMBRANE
MEMBRANE CEMENT PER ROOFING MANUFACTURER'S SPEC.
POLYURETHANE ELASTOMERIC SEALANT
EXISTING ROOF SYSTEM
ATTACH STEEL ANGLE TO BUILT-UP 2x12 WITH (2) 1/2"ø x 3" LONG GALV., LAG BOLTS.
4x3x3/8"x0'-4" LONG GALV. (LLV) STEEL ANGLE (TYP. OF 4) FASTENED TO ROOF WITH 1/2"ø HILTI KWIK BOLT 3 (EXPANSION ANCHOR) W/ 2¼" EMBEDMENT
EXISTING CONCRETE DECK

DETAIL @ WOOD CURB

SCALE: N.T.S

NOTE:

REFER TO THE FINAL RF DATA SHEET FOR FINAL ANTENNA SETTINGS.

NOTE:

AN ANALYSIS FOR THE CAPACITY OF THE EXISTING STRUCTURES TO SUPPORT THE PROPOSED EQUIPMENT SHALL BE DETERMINED PRIOR TO CONSTRUCTION. REFER TO STRUCTURAL ANALYSIS BY: HUDSON DESIGN GROUP LLC, DATED: MARCH 08, 2012.

NOTES:

1. SUBCONTRACTOR SHALL LEVEL CURB AS NEEDED.
2. SUBCONTRACTOR SHALL COORDINATE ROOFING WORK WITH BUILDING VENDOR SO NOT TO VOID ROOF WARRANTY.
3. SUBCONTRACTOR TO FASTEN EQUIPMENT TO P.T. WOOD CURB PER MANUFACTURER'S SPECIFICATION.

Hudson Design Group LLC
1600 OSGOOD STREET BUILDING 20 NORTH, SUITE 3-101 N. ANDOVER, MA 01845
TEL: (978) 557-5553 FAX: (978) 336-5586

NEXLINK GLOBAL SERVICES
a UniTek GLOBAL SERVICES company
800 MARSHALL PHELPS ROAD UNIT#: 2A
WINDSOR, CT 06095

SITE NUMBER: ME5045
SITE NAME: PORTLAND USM
248 DEERING AVENUE
PORTLAND, ME 03082
CUMBERLAND COUNTY

at&t
550 COCHITUATE ROAD
FRAMINGHAM, MA 01701

NO.	DATE	REVISIONS	BY	CHK	APP'D
2	03/20/12	ISSUED FOR CONSTRUCTION	HC	DC	DPH
1	02/23/12	ISSUED FOR PERMITTING	RP	DC	DPH
0	02/14/12	ISSUED FOR REVIEW	RP	DC	DPH

SCALE: AS SHOWN | DESIGNED BY: RP | DRAWN BY: RP

AT&T

STRUCTURAL DETAILS & MODIFICATION PLAN (LTE)

JOB NUMBER	DRAWING NUMBER	REV
5045.01	S-1	2

PORTLAND MAINE

Strengthening a Remarkable City, Building a Community for Life • *www.portlandmaine.gov*

Receipts Details:

Tender Information: Check , BusinessName: Nexlink Global Services, Inc., Check Number: 6529
Tender Amount: 220.00

Receipt Header:

Cashier Id: gguertin
Receipt Date: 4/23/2012
Receipt Number: 43147

Receipt Details:

Referance ID:	6216	Fee Type:	BP-Constr
Receipt Number:	0	Payment Date:	
Transaction Amount:	220.00	Charge Amount:	220.00
Job ID: Job ID: 2012-04-3828-CH OF USE - modification & upgrade of existing wireless commun			
Additional Comments: 246 Deering Ave			

Thank You for your Payment!

STRUCTURAL ANALYSIS REPORT

For

ME 5045 (LTE)

PORTLAND USM

246 Deering Avenue
Portland, ME 03082

Equipment Curb on the Roof; Antennas Mounted on the Building Façade

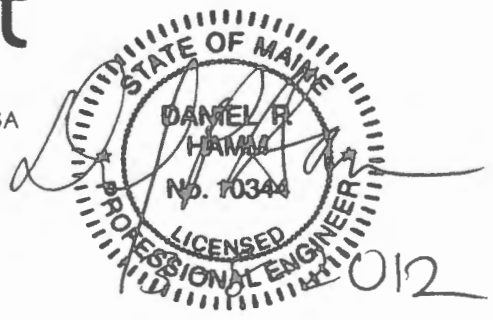
Prepared for:

at&t

500 Enterprise Drive, Suite 3A
Rock Hill, CT 06067

Dated:

March 8, 2012



Prepared by:
HUDSON DESIGN GROUP, LLC.
1600 Osgood Street Building 20 North, Suite 2-101
North Andover, MA 01845
Phone: (978) 557-5553
www.hudsondesigngroupllc.com

Hudson Design Group LLC

SCOPE OF WORK:

Hudson Design Group LLC (HDG) has been authorized by AT&T to conduct a structural evaluation of the structure supporting the proposed AT&T equipment located in the areas depicted in the latest HDG's construction drawings.

This report represents this office's findings, conclusions and recommendations' pertaining to the support of AT&T's proposed LTE Equipment.

This office conducted an on-site visual survey of the above areas on March 6, 2012. Attendees included Sergio Anastacio (HDG-Assistant Project Manager).

CONCLUSION SUMMARY:

As-built plans prepared by Donald L. Dimick were available for our use. The previous stamped drawings and design calculations prepared by Areal Spectrum, were available for our reference.

A limited visual survey of the structure was completed in or near the areas of the Proposed Work. Based on our evaluation, we have determined that, in general, structural designs to support the proposed AT&T Equipment within or near the Proposed Location can be completed and components installed with **NO STRUCTURAL UPGRADES REQUIRED** to the existing structure.

HDG recommends supporting the new LTE Equipment on a curb platform extension. The new extension is recommended to be installed directly over the building columns to adequately support the new loading. Reference the latest HDG's construction drawings for details.

A summary of the proposed support types and attachment locations are as follows:

(1) LTE Antenna (SBNH-1D6565C) (96.4"x11.9"x7.1" – Wt. 61lbs.) (Alpha Sector)...Mounted on a new steel pipe and mounting brackets, secured by the building facade.

(2) LTE Antennas (KMW AM-X-CD-16-65-00T) (72"x11.8"x5.9" - Wt. 48.5lbs.) (Beta and Gamma Sectors)....Mounted on new steel pipes supported by the existing antenna mounts.

(1) Emerson Outdoor Power Cabinet (Wt.=2150 lbs)...Supported by the new equipment curb extension.

(2) Purcell Cabinets (Wt. = 250 lbs/each).....Supported by the new equipment curb extension.

(3) Surge Arrestor DC2-48-60-0-9E (1 per sector)...Mounted on new unistrut components.

(6) RRH (2 per sector) (Wt. = 50 lbs/each).....Mounted on new unistrut components.
Referenced documents are attached.

Hudson Design Group LLC

Referenced documents are attached.

DESIGN CRITERIA:

1. International Building Code 2009, ASCE 7-10 Minimum Design Loads for Buildings and Other Structures.

   Wind Analysis:

Reference Wind Speed:	110 MPH	(FIG 26.5-1C; ASCE 7-10)
Category:	C	(26.7.3; ASCE 7 -10)
Gust Effect Factor (G):	0.85	(26.9.1; ASCE 7-10)
Force Coefficient (Cf):	Varies	(FIG 29.5-1 thru 29.5-3; ASCE 7-10)
F = qz * G * Cf * Af:		(Equation 29.5-1; ASCE 7-10)

   Snow Loading:

Ground Snow Load (Pg):	60 psf	(FIG 7-1; ASCE 7-10)
Flat Roof Snow Load (Pf):	37.8 psf	

   Pf = 0.7 * Ce * Ct * I * Pg (Equation 7.3-1; ASCE 7-10)

   Ce=0.9; Ct=1.0; I=1.0

2. EIA/TIA -222- G Structural Standards for Steel Antenna Towers and Antenna Supporting Structures

County:	Cumberland
Wind Load:	100 mph

3. Approximate height above grade to antennas:

   85'-2"+/- (Beta and Gamma sectors)
   88'-8"+/- (Alpha sector)

Hudson Design Group LLC

EXISTING ROOF CONSTRUCTION:

The roof construction appears to consist of an adhered roofing membrane on top of a reinforced concrete slab supported by reinforced concrete columns and bearing walls.

Antenna SUPPORT RECOMMENDATIONS:

- The new LTE Alpha sector antenna is proposed to be supported by a new steel pipe and mounting brackets, secured to the building facade.
- The new LTE Beta and Gamma sector antennas are proposed to be supported by new steel pipes, secured to the existing antenna support angles.

RRH's / Surge Arrestor SUPPORT RECOMMENDATIONS:

- The new Alpha sector Surge Arrestor and RRH's are proposed to be mounted on new unistrut components, secured to the building using epoxy anchors.
- The new Beta and Gamma sector Surge Arrestors and RRH's proposed to be mounted on new unistrut components, secured to the existing antenna support angles.

EQUIPMENT SUPPORT RECOMMENDATIONS:

HDG recommends that the proposed equipment be supported by the new equipment rooftop curb extension as shown in the latest HDG construction drawings.

OTHER RECOMMENDATIONS:

HDG recommends that the new curb extension be installed directly over the building columns to adequately support the new equipment load. (Contractor to verify the column locations).

Hudson Design Group LLC

Notes:

1. Reference the latest HDG construction drawings for all the equipment locations.
2. All detail requirements will be designed and furnished in the construction drawings.
3. Mount all equipment per manufacturer's specifications.
4. HDG is under the assumption that the equipment curb was located over building columns.
5. All structural members and their connections are assumed to be in good condition and are free from defects with no deterioration to its member capacities.

Hudson Design Group LLC

EXISTING ANTENNAS:

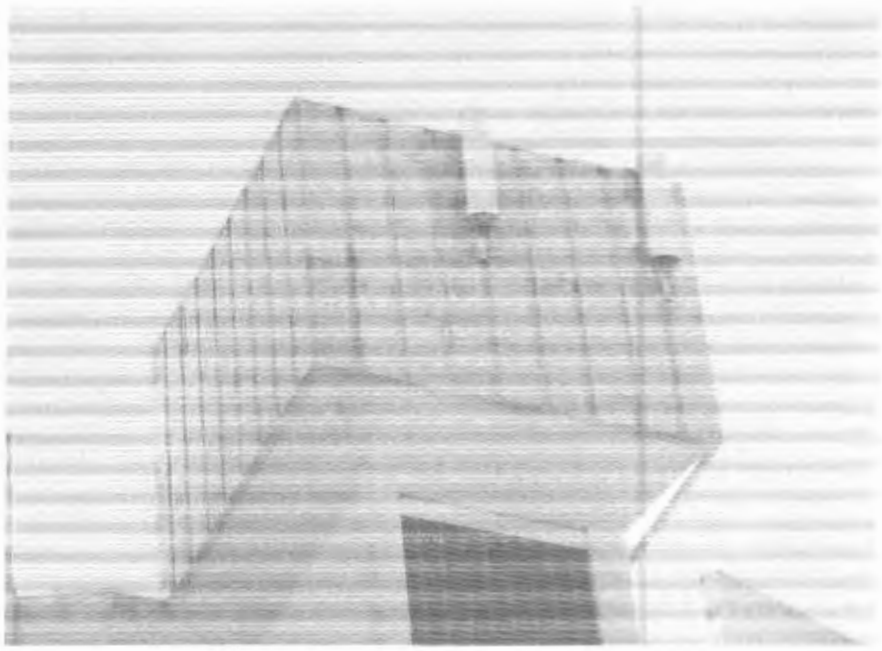


Photo 1: Sample photo illustrating the existing Alpha sector antennas.

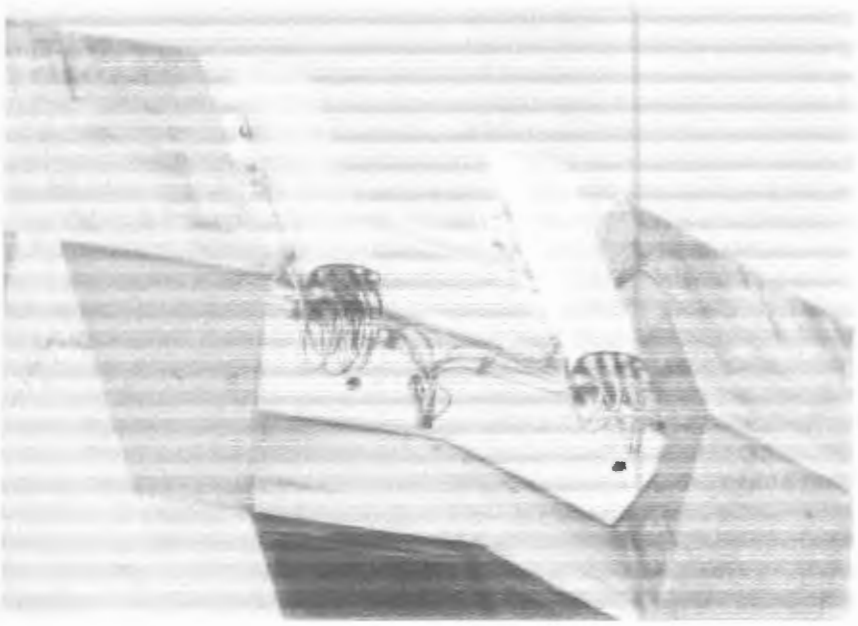


Photo 2: Sample photo illustrating the existing Beta sector antennas.

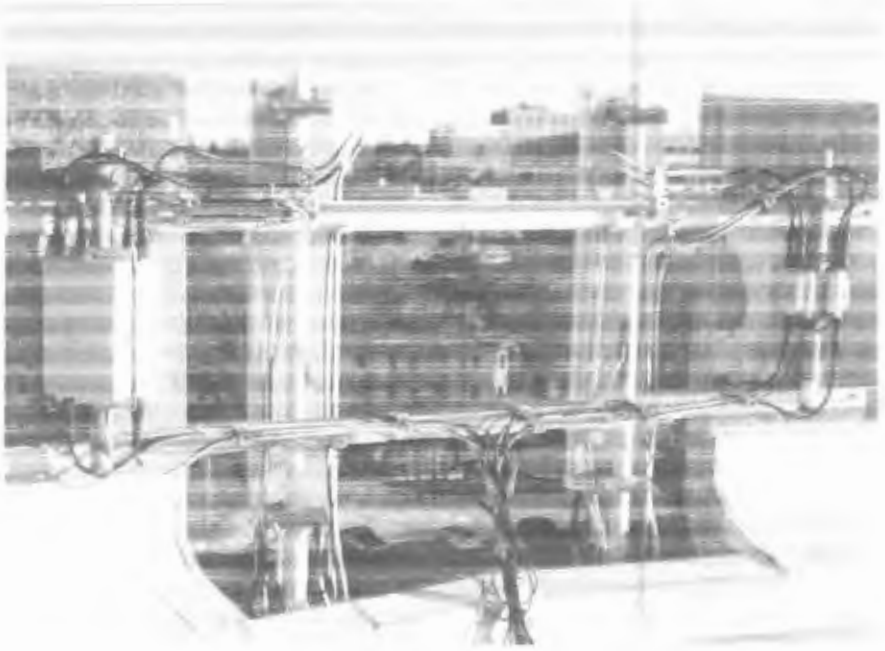


Photo 3: Sample photo illustrating the existing Gamma sector antennas.

Hudson Design Group LLC

EXISTING EQUIPMENT:

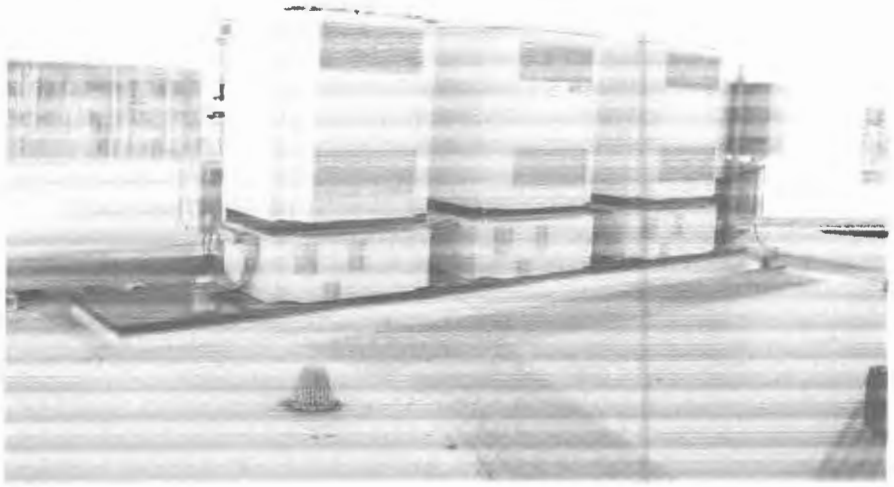


Photo 4: Sample photo illustrating the existing equipment.

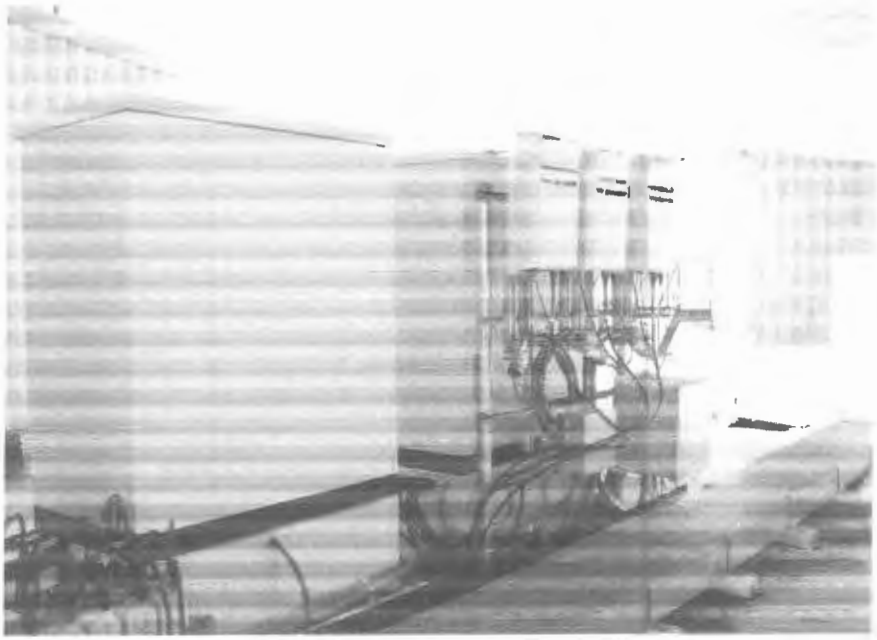


Photo 5: Sample photo illustrating the existing equipment.

Hudson Design Group LLC

Calculations

Date: 03-20-12
Project Name: Portland USM
Project Number: ME5045
Designed By: AA **Checked By:** MSC

Hudson Design Group LLC

2.6 5.2 Velocity Pressure Coeff:

$K_z = 2.01\ (z/z_g)^{2/\alpha}$

K_z= **1.234**

z= **88.67** (ft)
z_g= 900 (ft)
α= 9.5

$K_{zmin} \le K_z \le 2.01$

Table 2-4

Exposure	Z_g	α	K_{zmin}	K_e
B	1200 ft	7	0.70	0.90
C	900 ft	9.5	0.85	1
D	700 ft	11.5	1.03	1.10

2.6.6.4 Topographic Factor:

Table 2-5

Topo. Category	K_t	f
2	0.43	1.25
3	0.53	2
4	0.72	1.5

$K_{zt} = [1+(K_e K_t/K_h)]^2$ $K_h = e^{(1*z/H)}$

K_{zt}= #DIV/0!

(If Category 1 then K_{zt} =1.0)

Category= **1**

K_h= #DIV/0!
K_e= 0 (from Table 2-4)
K_t= 0 (from Table 2-5)
f= 0 (from Table 2-5)
z= 88.67
H= 0 (Ht. of the crest above surrounding terrain)
K_{zt}= 1.00

Date: 03-20-12
Project Name: Portland USM
Project Number: ME5045
Designed By: AA **Checked By:** MSC

Hudson Design Group LLC

2.6.7 Gust Effect Factors

2.6.7.1 Self Supporting Lattice Structures

Gh = 1.0 Latticed Structures > 600 ft

Gh = 0.85 Latticed Structures 450 ft or less

Gh = 0.85 + 0.15 (h/150 - 3.0) h= ht. of structure

h= 88.67 Gh= 0.48867

2.6.7.2 Guyed Masts Gh= 0.85

2.6.7.3 Pole Structures Gh= 1.1

2.6.7.4 Structures Supported on Other Structures

(Cantilivered tubular or latticed spines, pole, structures on buildings (ht. width ratio > 5)

Gh= 1.35 Gh= 1.35

Date: 03-20-12
Project Name: Portland USM
Project Number: ME5045
Designed By: AA **Checked By**: MSC

Hudson Design Group LLC

2.6.8 Design Ice Thickness:

$t_{iz} = 2.0*t_i*I*K_{iz}*(K_{zt})^{0.35}$

t_{iz}= **2.21**

t_i= 1
I= 1
K_{iz}= 1.10
K_{zt}= 1

$K_{iz} = (z/33)^{0.10} \leq 1.4$

K_{iz}= **1.10**

Calculating the weight of ice, the cross-sectional area of ice shall be determined by:

$A_{iz} = \pi*t_{iz}*(D_c + t_{iz})$

Dc= 96.4 (in) Largest Dim of Member

A_{iz} = **683.94**

2.6.9 Design Wind Load:

F= αz*Gh*(EPA's)

$q_z = 0.00256*K_z*K_{zt}*K_d*V_{max}^2$

q_z= 30.01

K_z= 1.234
K_{zt}= 1
K_d= 0.95
V_{max}= 100

Table 2-2

Structure Type	Wind Direction Probability Factor, Kd
Latticed structures with triangular, square or rectangular cross sections	**0.85**
Tubular pole structures, latticed structures with other cross sections, appurtenances.	**0.95**

Date: 03-20-12
Project Name: Portland USM
Project Number: ME5045
Designed By: AA **Checked By:** MSC

Hudson Design Group LLC

Determine Cf:

If lattice Structure See Manual

If Tubular Pole Structure, Use Corrected Value from Table 2-7 Below:

C mph.ft	Round	18 Sided	16 Sided	12 Sided	8 Sided
< 32 (Subcritical)	1.2	1.2	1.2	1.2	1.2
32 to 64 (Transitional)	$38.4/C^{1.0}$	$25.8/C^{0.885}$	$12.6/C^{0.678}$	$2.99/C^{0.263}$	1.2
> 64 (Supercritical)	0.6	0.65	0.75	1	1.2

$C = (I*K_{zt}*K_z)^{0.5}*V*D$

Dp = Outside Diameter or Out to Out: 0.2 feet

C= **22.22** **Cf=** 1.2

Appurtenances	Height	Width	Depth	Flat Area	Force Per Appurtenance
Item No.1	96.4	11.9	7.1	7.97	**387.30** (lbs)
Item No.2	72	11.8	5.9	5.90	**286.84** (lbs)
Item No.3	55	11	5	4.20	**204.26** (lbs)
Item No.4	0	0	0	0.00	**0.00** (lbs)
Item No.5	0	0	0	0.00	**0.00** (lbs)

TOTAL FORCE (ΣF_A) = **878.40** (lbs)

ICE WEIGHT CALCULATIONS

Project: ME5045

Thickness of ice:	0.75		
			PROPOSED
Weight of ice based on total radial SF area:			**Antenna**
Depth (in):	7.1		
height (in):	96.4		
Width (in):	11.8		
Total weight of ice on object:		89 pounds ice	
Weight of object:		61 pounds	
Combined weight of ice and object:		150 pounds	

Per foot weight of ice:			**Pipe**
pipe weight per foot:	3.65		
pipe length (ft):	8.5		
diameter (in):	2.375		
Per foot weight of ice on object:		2 pounds ice /ft	
Total weight of ice on object:		19 pounds	
Total weight of pipe:		31.025 pounds	
Combined weight of pipe and ice:		50 pounds	

* Density of ice used = 56 PCF

Total Weight:	199 pounds

ICE WEIGHT CALCULATIONS

Project: ME5045

Thickness of ice:	0.75		
			EXISTING
Weight of ice based on total radial SF area			Antenna
Depth (in):	5		
height (in):	55		
Width (in):	11		
Total weight of ice on object:		43 pounds ice	
Weight of object:	30 pounds		
Combined weight of ice and object:		73 pounds	

Per foot weight of ice:			Pipe
pipe weight per foot:	3.65		
pipe length (ft):	6		
diameter (in):	2.375		
Per foot weight of ice on object:		2 pounds ice /ft	
Total weight of ice on object:		13 pounds	
Total weight of pipe:		21.9 pounds	
Combined weight of pipe and ice:		35 pounds	

* Density of ice used = 56 PCF

Total Weight:	108 pounds

Project: ME5045 (LTE)

Location: ANTENNA SUPPORT ANGLE (WORSE CASE)
Multi-Loaded Multi-Span Beam
[2009 International Building Code(AISC 13th Ed ASD)]
A36 L4x4x1/4 x 5.0 FT Leg Up
Section Adequate By: 410.4%
Controlling Factor: Shear

Andres Agudelo
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North Andover, MA 01845

page / of

StruCalc Version 8.0.111.0 3/20/2012 2:23:54 PM

DEFLECTIONS	Center	
Live Load	0.02	IN L/3163
Horizontal Component	0.01	
Dead Load	0.00	in
Horizontal Component	0.00	in
Total Load	0.02	IN L/2908
Horizontal Component	0.01	

Live Load Deflection Criteria: L/360 Total Load Deflection Criteria: L/240

REACTIONS	A	B
Live Load	167 lb	130 lb
Dead Load	17 lb	17 lb
Total Load	183 lb	146 lb
Bearing Length	0.63 in	0.63 in

BEAM DATA	Center
Span Length	5 ft
Unbraced Length-Top	1.5 ft
Unbraced Length-Bottom	5 ft

STEEL ANGLE PROPERTIES
L4x4x1/4 - A36

Properties:

Yield Stress:	Fy =	36 ksi
Modulus of Elasticity:	E =	29000 ksi
Depth (Leg Length):	d =	4 in
Leg Thickness:	tw =	0.25 in
Distance to Angle Toe of Fillet:	k =	0.63 in
Moment of Inertia About X-X Axis:	Ix =	3 in4
Section Modulus About X-X Axis:	Sx =	1.03 in3

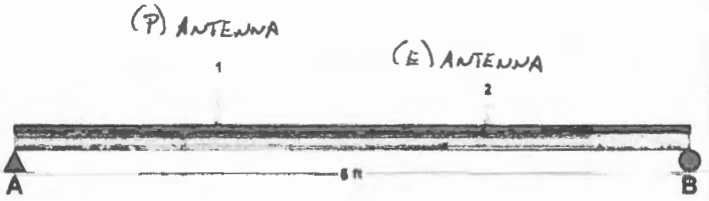
Design Properties per 13th Edition AISC Steel Manual:

Angle Tip is in Compression		
Flange Buckling Ratio:	FBR =	16
Allowable Flange Buckling Ratio for Compact:	AFBR =	15.33
Allowable Flange Buckling Ratio for Non-Compact:	AFBR_NC =	25.83
Elastic Lateral-Torsional Buckling Moment:	Me =	114.89 ft-lb
Nominal Flexural Strength w/ Safety Factor	Mn =	1962.04 ft-lb
Controlling Equation:	F10-3	
Controlling Cv Factor:	Cv =	1
Nominal Shear Strength w/ Safety Factor:	Vn =	12934 lb

Controlling Moment: 267 ft-lb
1.5 Ft from left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s) 2
Controlling Flexural Shear: 183 lb
Controlling Torsional Shear (C-G4-2): 2351 lb
Controlling Shear: 2534 lb
At left support of span 2 (Center Span)
Created by combining all dead loads and live loads on span(s

Comparisons with required sections:	Req'd	Provided
Moment of Inertia (deflection):	0.34 in4	3 in4
Moment:	267 ft-lb	1962 ft-lb
Shear:	2534 lb	12934 lb

LOADING DIAGRAM



UNIFORM LOADS	Center
Uniform Live Load	0 plf
Uniform Dead Load	0 plf
Beam Self Weight	7 plf
Total Uniform Load	7 plf

POINT LOADS - CENTER SPAN	One	Two
Load Number		
Live Load	194 lb	102.5 lb
Dead Load	0 lb	0 lb
Location	1.5 ft	3.5 ft

$F_{one} = \frac{388\#}{2} = 194\#$ $F_{two} = \frac{205\#}{2} = 102.5\#$

DATE: 03-20-12
Project Name: PORTLAND USM
Project No.: ME 5045 (LTE)
Design By: AA Chk'd By: MSC Page ___ of ___

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* CHECK ANTENNA SUPPORT ANCHORING SYSTEM: (WORSE CASE)

OVERVIEW: THE ANTENNA SUPPORT ANGLES ARE ATTACHED TO THE PARAPET AT EACH END WITH (2) 1/2 HILTI HY-20 (REFERENCE ORIGINAL DESIGN DRAWINGS PREPARED BY AERIAL SPECTRUM)

$F_T = 525\#$
$F_V = 1230\#$
HIT-HY150 ([illegible] EMBEDMENT) (ASSUMED)

- TENSION

$$f_t = \frac{183\#}{2 \text{ ANCHORS}} = 91.5\#/\text{ANCHOR} < 525\#/\text{ANCHOR} \therefore \text{O.K.!}$$

- SHEAR:

$$f = \frac{199\# + 108\# + 40\#}{2} = 173.5\#$$

$$f_v = \frac{173.5\#}{2 \text{ ANCHORS}} = 86.75\#/\text{ANCHOR} < 1230\#/\text{ANCHOR} \therefore \text{O.K.!}$$

- CHECK COMBINED TENSION/SHEAR:

$$\frac{f_T}{F_T} + \frac{f_V}{F_V} \leq 1.0$$

$$\frac{91.5}{525} + \frac{86.75}{1230} = 0.24 < 1.0 \therefore \text{O.K.!}$$

157132

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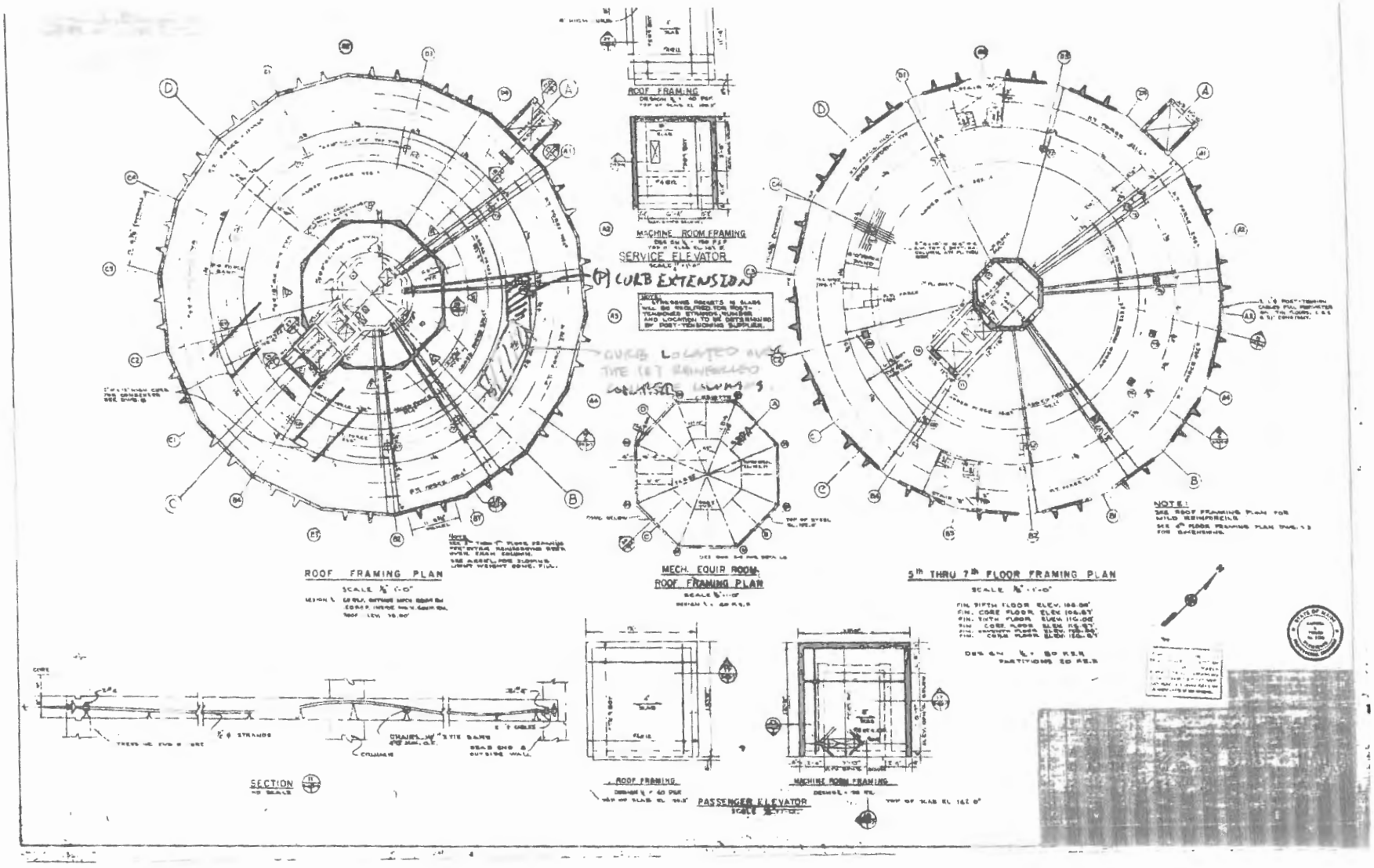
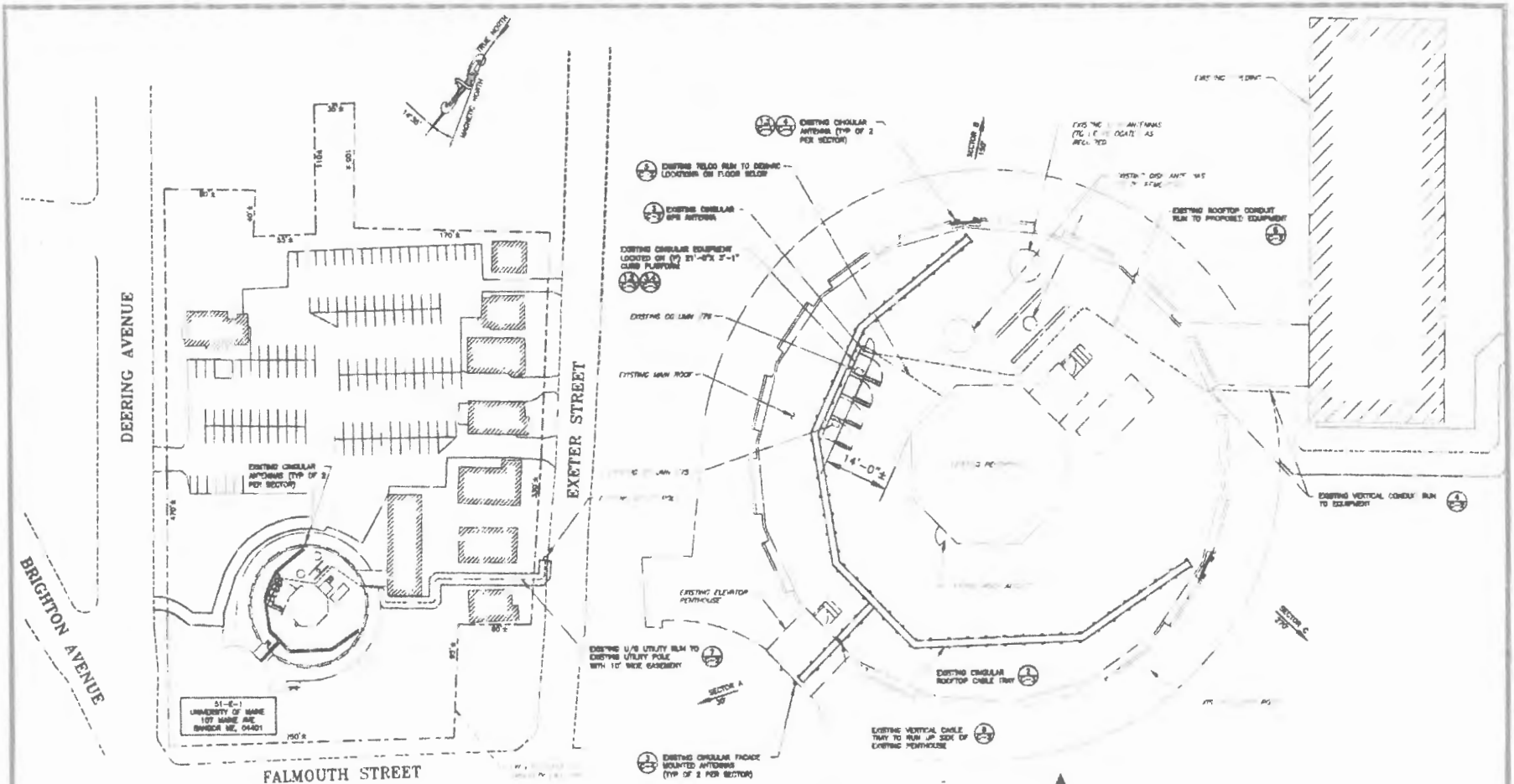
Referenced Drawings


ROOF FRAMING
MACHINE ROOM FRAMING
SERVICE ELEVATOR
(P) CURB EXTENSION
ROOF FRAMING PLAN
MECH. EQUIP. ROOM
ROOF FRAMING PLAN
5th THRU 7th FLOOR FRAMING PLAN
SECTION
ROOF FRAMING
MACHINE ROOM FRAMING
PASSENGER ELEVATOR



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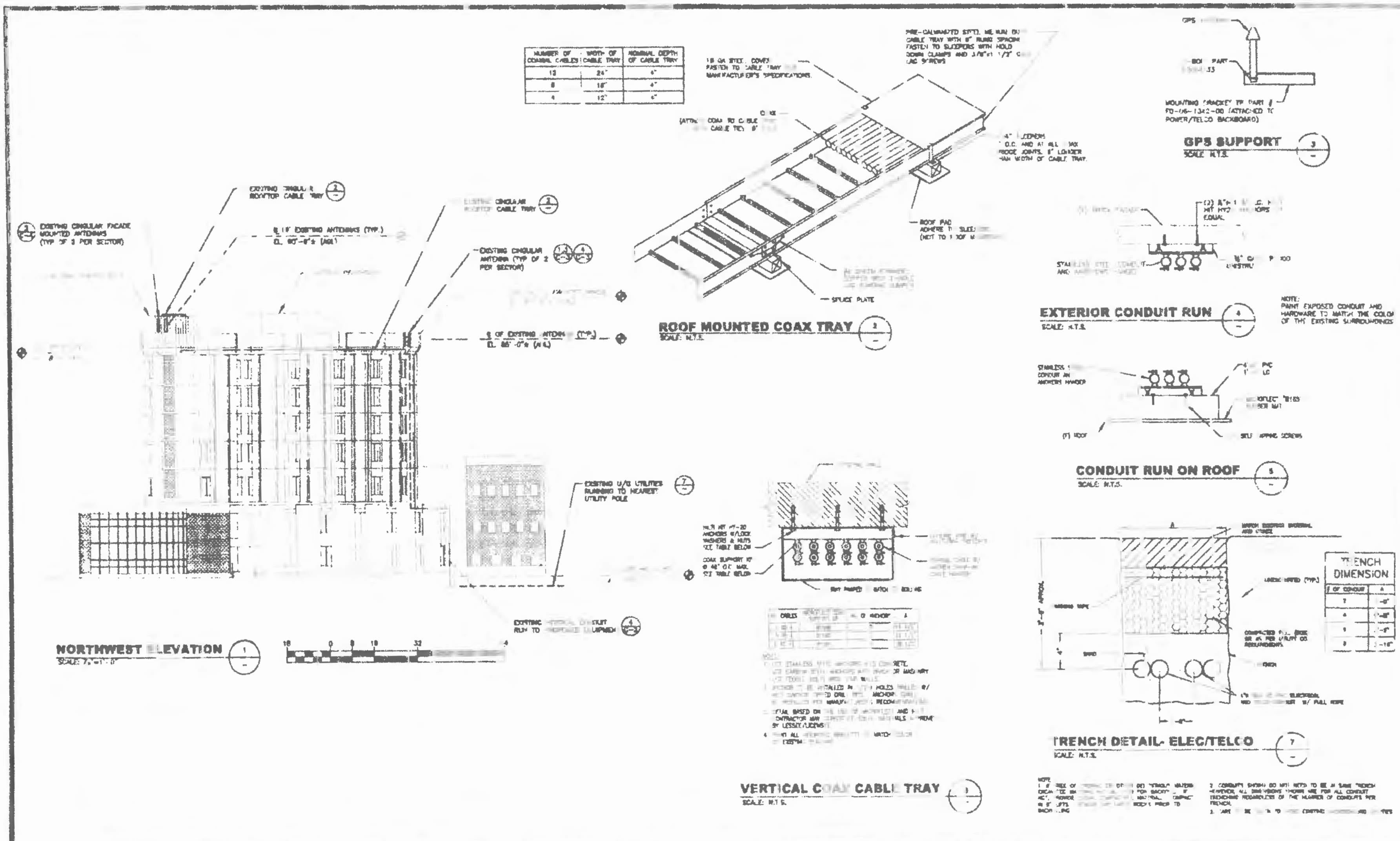
SITE PLAN
& ROOF PLAN

DRAWING NUMBER: A-1 | 0



NORTHWEST ELEVATION
SCALE: 3/32"=1'-0"
ROOF MOUNTED COAX TRAY
SCALE: N.T.S.
GPS SUPPORT
SCALE: N.T.S.
EXTERIOR CONDUIT RUN
SCALE: N.T.S.
CONDUIT RUN ON ROOF
SCALE: N.T.S.
TRENCH DETAIL- ELEC/TELCO
SCALE: N.T.S.
VERTICAL COAX CABLE TRAY
SCALE: N.T.S.
EXISTING CINGULAR FACADE MOUNTED ANTENNAS (TYP OF 3 PER SECTOR)
EXISTING CINGULAR ROOFTOP CABLE TRAY
EXISTING CINGULAR ANTENNA (TYP OF 2 PER SECTOR)
EXISTING U/G UTILITIES RUNNING TO NEAREST UTILITY POLE
SPLICE PLATE
NOTE: PAINT EXPOSED CONDUIT AND HARDWARE TO MATCH THE COLOR OF THE EXISTING SURROUNDINGS
TRENCH DIMENSION

NUMBER OF COAXIAL CABLES	WIDTH OF CABLE TRAY	NOMINAL DEPTH OF CABLE TRAY
12	24"	4"
8	18"	4"
4	12"	4"

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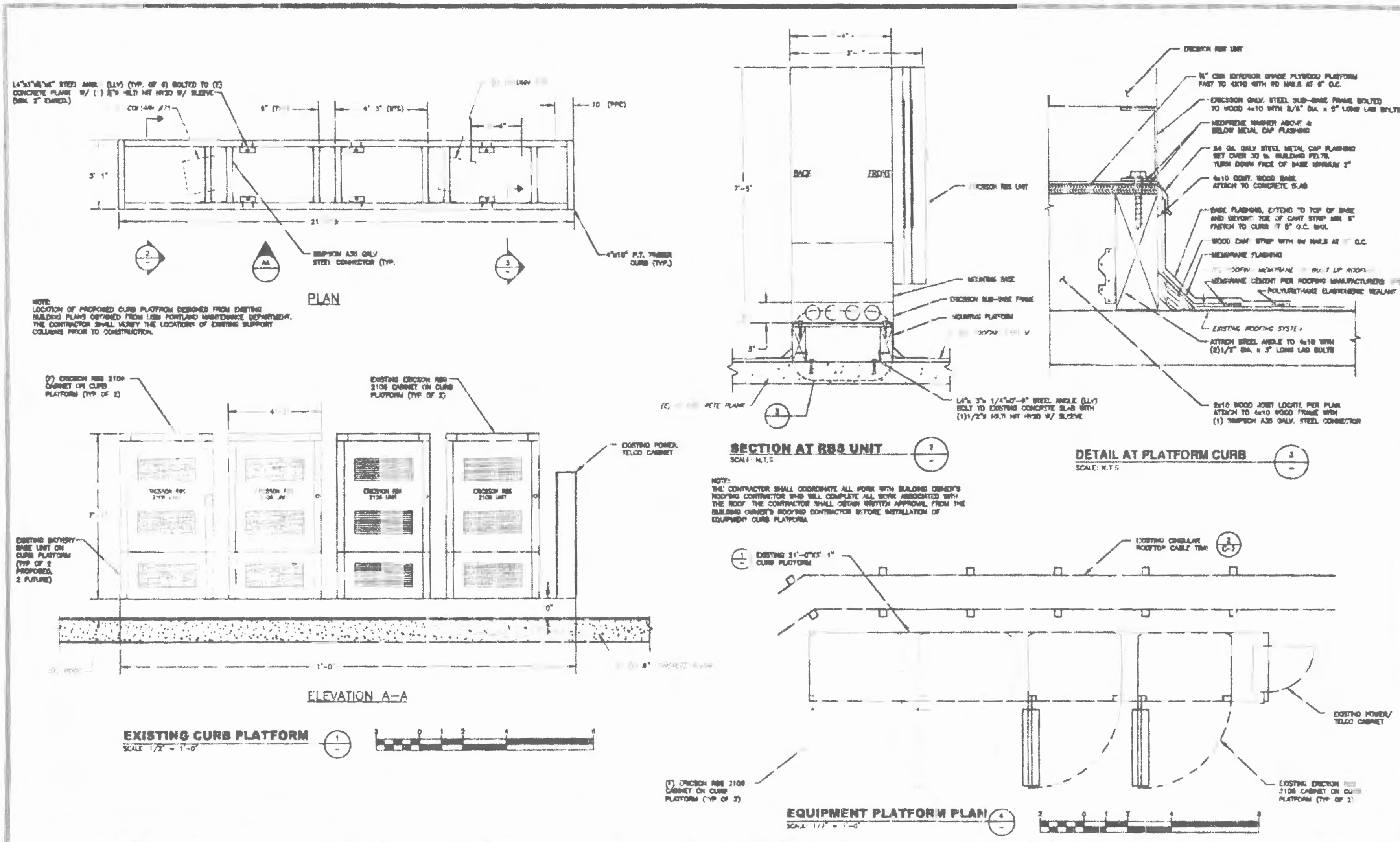
ELEVATION AND CONSTRUCTION DETAILS

2


PLAN
NOTE:
LOCATION OF PROPOSED CURB PLATFORM DESIGNED FROM EXISTING BUILDING PLANS OBTAINED FROM USM PORTLAND MAINTENANCE DEPARTMENT. THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF EXISTING SUPPORT COLUMNS PRIOR TO CONSTRUCTION.
ELEVATION A–A
EXISTING CURB PLATFORM
SCALE 1/2" = 1'-0"
SECTION AT RBS UNIT
SCALE: N.T.S.
NOTE:
THE CONTRACTOR SHALL COORDINATE ALL WORK WITH BUILDING OWNER'S ROOFING CONTRACTOR WHO WILL COMPLETE ALL WORK ASSOCIATED WITH THE ROOF. THE CONTRACTOR SHALL OBTAIN WRITTEN APPROVAL FROM THE BUILDING OWNER'S ROOFING CONTRACTOR BEFORE INSTALLATION OF EQUIPMENT CURB PLATFORM.
DETAIL AT PLATFORM CURB
SCALE: N.T.S.
EQUIPMENT PLATFORM PLAN
EXISTING POWER/ TELCO CABINET

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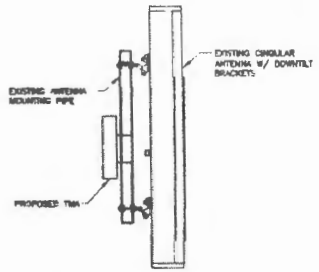
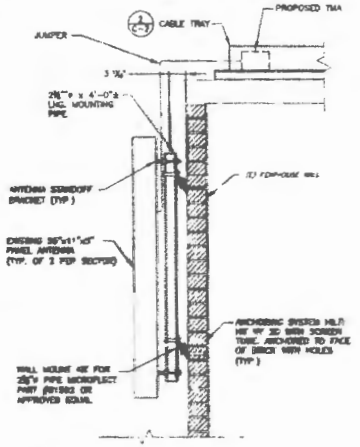
CONSTRUCTION DETAILS

C-1



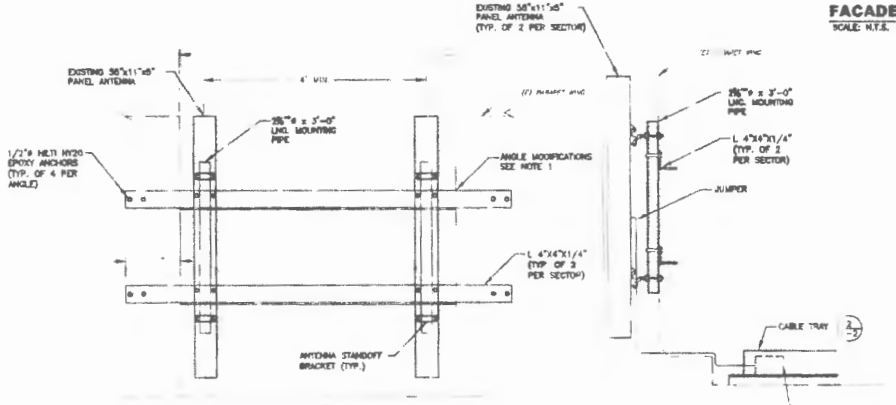
TMA NOTE:
THE REQUIRED NUMBER OF TMA'S PER ANTENNA BASED ON RF REQUIREMENTS. CONTRACTOR TO VERIFY PRIOR TO CONSTRUCTION

ANTENNA DETAIL 1
SCALE: N.T.S.



NOTES:
1. PRIME AND PAINT ALL MOUNTING BRACKETS AND ANTENNAS TO MATCH (E) BUILDING FACADE W/GROUT LINES.

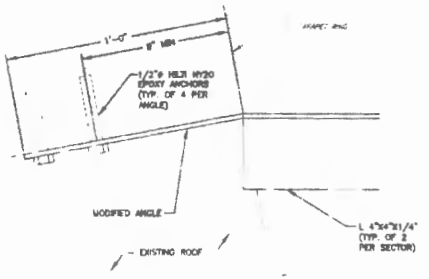
FACADE ANTENNA MOUNTING DETAIL 2
SCALE: N.T.S.



NOTES:
1. C.I.T AND BEND ANGLE FLUSH WITH PARAPET WALL (TYP OF 2 PER ANGLE)

NOTES:
1. PRIME AND PAINT ALL MOUNTING BRACKETS AND ANTENNAS TO MATCH (E) BUILDING FACADE W/GROUT LINES

ANTENNA MOUNTING DETAILS 3
SCALE: N.T.S.



ANGLE MOUNTING DETAIL 4
SCALE: N.T.S.

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CONSTRUCTION
500 MAIN STREET
BOLTON, MA
PHONE: (781)

DATE	REVISIONS	BY
AS		PRC

CINGULAR WIRELESS

CONSTRUCTION DETAILS

C 0

PTLDME5045

ONE GENERAL WAY PO BOX 373 READING, MA 01867 P: (781) 942-0024 F: (781) 942-0551	CLIENT NAME STATE OF MAINE LAW SCHOOL	DATE: 4/12/06	PAGE: 1/7
		BY: MJ TARTEL	
		SITE NAME: USM PORTLAND	

WELL LOCATION FOR CAISSONS

CHECK COLUMN 76 & 75

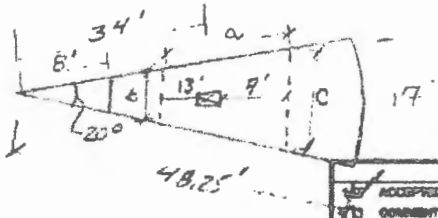
LOADS:

FROM DESIGN DRAWINGS

ROOF 60 #/ft²
7TH FLOOR 160 #/ft²
6TH FLOOR 100 #/ft²
5TH FLOOR 100 #/ft²
4TH FLOOR 100 #/ft² (CORRIDOR LOAD)

LIGHT WT CONCRETE ON ALL FLOORS
115 #/ft³

CALCULATE TRIBUTARY AREA FOR COLUMN



$c = 2(\tan 10(41)) = 14.4$

$b = 2(\tan 10(8)) = 2.8$

$a = 20'$

$AREA = (C+b)/2\,(a) = 172$

SLAB THICKNESS = 8" ⇒ 8/12 (192) = 114.9 ft³

COLUMN WT = (19")(18")/144 (10') = 22.5 ft³

LOAD TOTALS:

	LL	DL SLAB	COLUMN
ROOF	10.3 K	13.2 K	2.6 K
7TH	17.2 K	13.2 K	2.6 K
6TH	17.2 K	13.2 K	2.6 K
5TH	17.2 K	13.2 K	2.6 K

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AERIAL SPECTRUM

CLIENT NAME: STATE OF MAINE DAY SCHOOL

DATE: 4/12/10 PAGE: 2/-

BY: M. MACOL

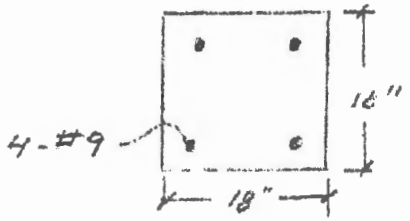
SITE NAME: [illegible]

COLUMN LOAD

MAX COLUMN LOAD ON TOP OF 4/11 FLOOR

$P = 10.3 + (17.2)(3) + (13.2)(4) + (2.6)(4) = 125^k$

CHECK COLUMN



$K = 0.5$

$l = 10'$

TOTAL LOAD W/ CABINETS 10/12 = 5^k

$125^k + 5^k = 130^k$

SEE ATTACHED SPREADSHEET
(MATHCAD)

Input Column Properties

$f'c = 3000psi$ $As := 2in^2$ $d' := 2.564in$ $b := 18in$

$fy := 60000psi$ $A's := 2in^2$ $h := 18in$

$Ag := b \cdot h$ $Ag = 324\,in^2$ $y_{bar} := \frac{h}{2}$ $y_{bar} = 9\,in$

Maximum Vertical Loading

$Po = [0.85f'c \cdot (Ag - As - A's) + (As + A's) \cdot fy]$

$\boxed{Po = 1056\,kip}$ $\phi Po := 0.7 \cdot Po$ $\phi Po = 739.2\,kip$

$P_{nmax} := 0.8[0.85f'c \cdot (Ag - As - A's) + (As + A's) \cdot fy]$ $\phi P_{nmax} := 0.7 \cdot P_{nmax}$

$\boxed{P_{nmax} = 844.8\,kip}$ $\boxed{\phi P_{nmax} = 591.36\,kip}$ $\phi M_0 := 0$

Balance Condition

$d := h - d'$ $d = 15.44\,in$

$$c_b := \frac{87000}{87000 + \frac{fy}{psi}} \cdot d \qquad c_b = 9.14\,in$$

$$\varepsilon's := 0.003\left(\frac{c_b - d'}{c_b}\right) \qquad \varepsilon's = 0.00216\,\frac{in}{in}$$

$f's := 29000000psi \cdot \varepsilon's$ $f's = 62582.534\,psi$

$$\beta_1 := 0.85 - \frac{0.05\left(\frac{f'c}{psi} - 4000\right)}{1000} \qquad \beta_1 = 0.9$$

$a_b := \beta_1 \cdot c_b$ $a_b = 8.22\,in$

$P_{nb} := 0.85 \cdot f'c \cdot b \cdot a_b + A's \cdot f's - As \cdot fy$ $\phi P_{nb} := 0.7 \cdot P_{nb}$

$\boxed{P_{nb} = 382.556\,kip}$ $\boxed{\phi P_{nb} = 267.789\,kip}$

$M_{nb} := 0.85 \cdot f'c \cdot b \cdot a_b \cdot \left(y_{bar} - \frac{a_b}{2}\right) + A's \cdot f's \cdot \left(y_{bar} - d'\right) + As \cdot fy \cdot \left(d - y_{bar}\right)$ $\phi M_{nb} := 0.7 \cdot M_{nb}$

$\boxed{M_{nb} = 3422.942\,in \cdot kip}$ $\boxed{\phi M_{nb} = 199.7\,ft \cdot kip}$

$$e_b := \frac{M_{nb}}{P_{nb}} \qquad e_b = 8.95\,in$$

Pure Bending Mno

$a := \frac{As \cdot fy}{0.85 \cdot fc \cdot b}$ $a = 2.61\,in$

$c := \frac{a}{\beta_1}$ $c = 2.9\,in$

$\varepsilon's_m := 0.003 \cdot \left(\frac{c - d'}{c}\right)$ $\varepsilon's_m = 0.00035\,\frac{in}{in}$

$f's_m := 29000000psi \cdot \varepsilon's_m$ $f's_m = 10208.841\,psi$

$M_{no} := As \cdot fy \cdot \left(d - \frac{a}{2}\right)$ $\phi M_{no} := 0.9 \cdot M_{no}$

$M_{no} = 1695.5\,in\cdot kip$ $\phi M_{no} = 127.2\,ft\cdot kip$ $\phi P_0 := 0kip$

Compression Controls

$c_1 := \frac{c_b + h}{2}$ $c_1 = 13.57\,in$

$\varepsilon's_1 := 0.003 \cdot \left(\frac{c_1 - d'}{c_1}\right)$ $\varepsilon_{y1} := \frac{\frac{fy}{psi}}{29000000}$ $\varepsilon_{s1} := 0.003 \cdot \frac{d - c_1}{c_1}$

$\varepsilon's_1 = 0.00243\,\frac{in}{in}$ $\varepsilon_{y1} = 0.00207\,\frac{in}{in}$ $\varepsilon_{s1} = 0.00041\,\frac{in}{in}$ $\varepsilon's_{a1} := \min(\varepsilon's_1, \varepsilon_{y1})$

$fs_1 := \varepsilon_{s1} \cdot 29000000psi$ $f's_1 := \varepsilon's_{a1} \cdot 29000000psi$

$fs_1 = 11979.378\,psi$ $f's_1 = 60000\,psi$

$a_1 := \beta_1 \cdot c_1$ $a_1 = 12.21\,in$

$C_{c1} := 0.85 \cdot fc \cdot b \cdot a_1$ $C_{s1} := A's \cdot fy$ $T_{s1} := As \cdot fs_1$

$C_{c1} = 560.49\,kip$ $C_{s1} = 120\,kip$ $T_{s1} = 23.96\,kip$

$P_{n1} := C_{c1} + C_{s1} - T_{s1}$ $\phi P_{n1} := 0.7 \cdot P_{n1}$

$P_{n1} = 656.53\,kip$ $\phi P_{n1} = 459.57\,kip$

$M_{n1} := C_{c1} \cdot \left(y_{bar} - \frac{a_1}{2}\right) + C_{s1} \cdot \left(y_{bar} - d'\right) + T_{s1} \cdot \left(d - y_{bar}\right)$ $\phi M_{n1} := 0.7 \cdot M_{n1}$

$M_{n1} = 2548.84\,in\cdot kip$ $\phi M_{n1} = 148.682\,ft\cdot kip$

$e_1 := \frac{M_{n1}}{P_{n1}}$ $c_1 = 3.88\,in$

Tension Controls

$c_2 := \frac{c_b}{2}$ $c_2 = 4.57\,in$

$a_2 := \beta_1 \cdot c_2$

$\varepsilon's_2 := 0.003 \cdot \left(\frac{c_2 - d'}{c_2} \right)$ $a_2 = 4.11\,in$

$\varepsilon's_2 = 0.00132$

$fs_2 := \min(\varepsilon's_2 \cdot 29000000psi, 60000psi)$

$fs_2 = 38165.069\ psi$

$fs_2 := fy$

$fs_2 = 60000\ psi$

$C_{c2} := 0.85 \cdot f'c \cdot b \cdot a_2$ $C_{c2} = 188.7\,kip$

$C_{s2} := A's \cdot fs_2$ $C_{s2} = 76.33\,kip$

$T_{s2} := As \cdot fs_2$ $T_{s2} = 120\,kip$

$P_{n2} := C_{c2} + C_{s2} - T_{s2}$ $\phi P_{n2} := 0.7 \cdot P_{n2}$

$\boxed{P_{n2} = 145.03\,kip}$ $\boxed{\phi P_{n2} = 101.52\,kip}$

$M_{n2} := C_{c2} \cdot \left(y_{bar} - \frac{a_2}{2} \right) + C_{s2} \cdot (y_{bar} - d') + T_{s2} \cdot (d - y_{bar})$ $\phi M_{n2} := 0.7 \cdot M_{n2}$

$\boxed{M_{n2} = 2573.976\,in \cdot kip}$ $\boxed{\phi M_{n2} = 150.15\,ft \cdot kip}$

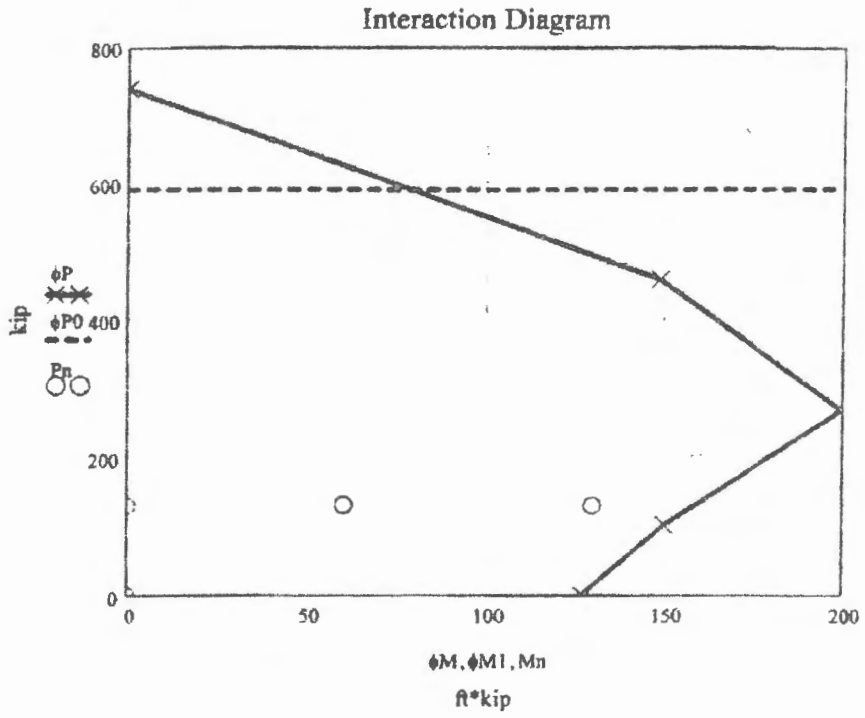
$e_2 := \frac{M_{n2}}{P_{n2}}$ $e_2 = 17.75\,in$

Interaction Diagram Loads and Moments

$$\phi M := \begin{pmatrix} \phi M_0 \\ \text{ft·kip} \\ \phi M_{n1} \\ \text{ft·kip} \\ \phi M_{nb} \\ \text{ft·kip} \\ \phi M_{n2} \\ \text{ft·kip} \\ \phi M_{no} \\ \text{ft·kip} \end{pmatrix} \qquad \phi P := \begin{pmatrix} \phi P_o \\ \text{kip} \\ \phi P_{n1} \\ \text{kip} \\ \phi P_{nb} \\ \text{kip} \\ \phi P_{n2} \\ \text{kip} \\ \phi P_0 \\ \text{kip} \end{pmatrix} \qquad \phi M1 := \begin{pmatrix} 0 \\ \text{ft·kip} \\ \phi M_{nb} \\ \text{ft·kip} \end{pmatrix} \qquad \phi P0 := \begin{pmatrix} \phi P_{nmax} \\ \text{kip} \\ \phi P_{nmax} \\ \text{kip} \end{pmatrix}$$

Loads and Moments from Structure (kip and ft-kip)

$$Pn := \begin{pmatrix} 130 \\ 130 \\ 130 \\ 0 \end{pmatrix} \qquad Mn := \begin{pmatrix} 0 \\ 60 \\ 130 \\ 0 \end{pmatrix}$$



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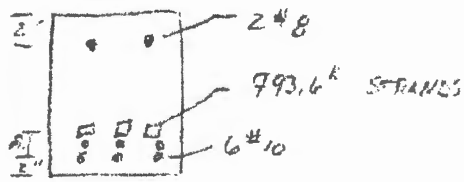
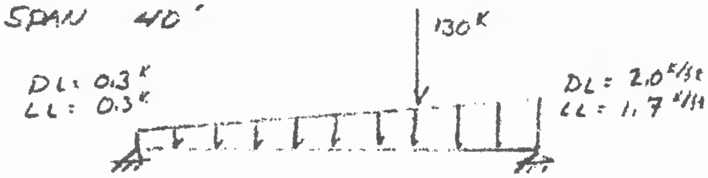
		BY: M. MASTO	
		SITE NAME: USM PORTLAND	

CHECK BEAM ON 4th FLOOR

BEAM B-2 & B-2A



SPAN 40'



$M = 1831$ ft kips $= 21972$ in kips

$$f^t = -\frac{P_c}{A_c}\left(1 + \frac{e\,C_t}{r^2}\right) + \frac{21972}{S_t}$$

$$= -\frac{793.6}{1260}\left(1 + \frac{17(21)}{12.12^2}\right) + \frac{21972}{8820} =$$

$$-0.63^{KSI}\left(1 + 2.43\right) + 2.49 = 0.329 \text{ KSI} \quad \underline{\underline{OK}}$$

$$f^b = -0.63\left(1 - 2.43\right) - 2.49 = -1.59^{KSI} \quad \underline{\underline{OK}}$$